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UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,914	08/18/2003	Liexiang Fan	2003P08374US	3652

7590 01/22/2007		EXAMINER
Siemens Corporation		KIM, CHONG R
Intellectual Property Department		
170 Wood Avenue South	ART UNIT	PAPER NUMBER
Iselin, NJ 08830	2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	Applicant(s)
Office Action Summary	10/642,914	FAN ET AL.
	Examiner	Art Unit	
	Charles Kim	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 September 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-21</u> is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-6,8,9,11 and 13-21</u> is/are rejected.

7)☒ Claim(s) <u>7,10 and 12</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>18 August 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All b)☐ Some * c)☐ None of:

　　　1.☐ Certified copies of the priority documents have been received.

　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.

　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
　　Paper No(s)/Mail Date <u>8/18/03, 9/22/03</u>.

4)☐ Interview Summary (PTO-413)
　　Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

Preliminary Amendment

1.   The preliminary amendment filed on September 22, 2003 has been entered and made of

record.

Information Disclosure Statement

2.   The information disclosure statements (IDS) submitted on August 18, 2003 and

September 22, 2003 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the

information disclosure statements are being considered by the examiner.

Claim Objections

3.   Claim 8 is objected to because of the following informalities: the phrase "at least one

characteristic the first and second display values" in lines 1-2 is grammatically incorrect. It

appears that applicant intended the phrase to read, "at least one characteristic of the first and

second display values." Appropriate correction is required.

4.   Claim 9 is objected to because of the following informalities: the phrase "modulating the

first and second display values also as a function..." is ambiguous because it is not clear why

"also" is in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1-6, 11, 13, 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by

Yoshihiro, J.P. Patent No. 10-94519 ("Yoshihiro"), the English translation of which is attached.

Referring to claim 1, Yoshihiro discloses a method for representing flow with a medical

imaging system (pages 2-3, paragraph 10. Yoshihiro explains that the method is performed by a

medical imaging system such as an X-ray, CT scanner, or MRI equipment), the method

comprising:

a.   determining a rate of change of a parameter (page 5, paragraph 45. Note that the

"blood flow" is interpreted as a parameter. Thus, computing the rate, pressure, and direction of

blood flow determines the rate of change of the parameter); and

b.   displaying a change in the parameter (blood flow) over time (figures 7A-7C) as a

function of the rate of change [paragraphs 45-48. Note that the change in the parameter (flow) is

depicted by the change in the "elementary streams" from figure 7A to 7B, and from 7B to 7C. In

addition, the elementary streams in each image are a function of the rate of change (rate,

pressure, and direction) as described in step (a); see paragraphs 45-46].

Referring to claim 2, Yoshihiro further discloses that step (a) further comprises:

a1.   determining the flow direction and magnitude (paragraph 45. Note that the determined "rate and pressure" of the blood flow is interpreted as a magnitude of the flow. In addition, the flow direction is determined and illustrated by the elementary streams in figure 6); and

a2.   determining the rate of change as a function of the flow direction and magnitude [paragraph 45. As noted above in claim 1, computing the blood flow rate, pressure, and direction determines the rate of change of a parameter. Thus, the rate of change is a function of the flow direction and magnitude (rate and pressure)];

wherein (b) comprises displaying the change as a perceived motion of a pixel (paragraph 46-48, figures 7A-7C. Note that the changes in the elementary streams shown in figures 7A-7C represent a perceived motion of a pixel).

Referring to claim 3, Yoshihiro further discloses that step (b) further comprises displaying a pattern for a plurality of pixel locations, the pattern varying as a function of the rate of change [paragraph 46-48, figures 7A-7C. Yoshihiro explains that the "change of the blood flow" is determined, and illustrated by the elementary streams in figures 7A-7C. Note that the elementary streams comprise patterns of a plurality of pixel locations. In addition, these patterns vary as a function of the rate of change--the rate, pressure, and direction of the blood flow varies (paragraphs 45-46)].

Referring to claim 4, Yoshihiro further discloses that step (a) further comprises determining the rate of change as proportional to motion for pixels associated with flow [paragraphs 45-48.. As mentioned above (claim 3), the "change of the blood flow" is determined,

and illustrated by the elementary streams in figures 7A-7C (paragraph 48). Note that the

variations in the elementary streams from figure 7A to figure 7B and from figure 7B to 7C

represent motion for pixels associated with flow. Moreover, the varying elementary streams

from figure 7A to figure 7B and from figure 7B to 7C are obtained by determining the rate of

change of the parameter--the rate, pressure, and direction of the blood flow. Thus, the rate of

change is proportional to the motion for pixels associated with flow, i.e., variations in the

elementary streams].

   Referring to claim 5, Yoshihiro discloses a method for representing flow with a medical

imaging system, the method comprising:

   a. assigning first display values to each of a first plurality of spatial locations

(paragraphs 45-48 and figure 7A. Note that the elementary streams comprise the first plurality of

spatial locations. Correspondingly, the pixel values of the elementary streams in figure 7A

comprise the first display values);

   b. tracking a flow direction and magnitude for each of the first plurality of spatial

locations (paragraph 45. Note that the flow rate, pressure, and direction are determined for each

point in the blood vessel);

   c. identifying a second plurality of spatial locations as a function of the flow

directions and magnitude (figure 7B. Note that the elementary streams in figure 7B represent a

shift from the elementary streams from figure 7A. This shift is based on the changes in the flow

directions and magnitude from figure 7A to 7B);

   d. assigning second display values to each of the second plurality of spatial locations

as a function of the first display values (figure 7B. Note that the display values of the shifted

elementary streams in figure 7B are the same as the display values for the elementary streams in figure 7A).

Referring to claim 6, Yoshihiro further discloses that step (a) comprises generating a first pattern (elementary streams) for the first plurality of spatial locations for a first image (figure 7A), the first plurality of spatial locations associated with flow, and step (d) comprises generating a second pattern (shifted elementary streams) for the second plurality of spatial locations for a second image (figure 7B), the second plurality of spatial locations associated with flow, each of the second plurality of spatial locations of the second pattern responsive to the first pattern shifted by the flow direction and magnitude for each of first plurality of spatial locations (paragraphs 45-48. Note that the pattern--elementary stream--in figure 7B represents the pattern in figure 7A shifted by the flow direction and magnitude, as noted above).

Referring to claim 11, Yoshihiro discloses a method for representing flow with a medical imaging system (pages 2-3, paragraph 10. Yoshihiro explains that the method is performed by a medical imaging system such as an X-ray, CT scanner, or MRI equipment), the method comprising:

a.   generating a first pattern for a plurality of pixels associated with flow for a first image (paragraphs 46-48. Note that the elementary streams in figure 7A is interpreted as the first pattern for a first image because it comprises a plurality of pixels and represents the blood flow);

b.   generating a second pattern for the pixels associated with flow for a second image, the second pattern responsive to the first pattern [paragraphs 46-48. Note that the elementary streams in figure 7B is interpreted as the second pattern for a second image because it represents the blood flow. In addition, the elementary streams in figure 7B (second pattern)

represent a "change in the blood flow" from the elementary streams in figure 7A and therefore,

are responsive to the elementary streams in 7A (first pattern)].

Referring to claim 13, Yoshihiro further discloses modulating (adapting) gray scale

values of pixel display values for the plurality of pixels (figure 7A). Note that the pixels

constituting the elementary streams are adapted to be displayed as gray values.

Referring to claim 16, Yoshihiro further discloses that step (b) comprises generating the

second pattern as representing movement of the first pattern [paragraphs 46-48. Note that the

elementary streams in figure 7B (second pattern) represent a "change in the blood flow" from the

elementary streams in figure 7A and therefore, represent a movement of the first pattern. This

movement is clearly illustrated by the shift in the elementary streams from figure 7A to figure

7B].

Referring to claim 17, Yoshihiro further discloses:

c.   determining a flow direction and magnitude for each of the plurality of pixels

[paragraph 45. Yoshihiro explains that the rate and pressure of the blood flow is calculated "in

each point in a blood vessel." Note that the rate and pressure of the blood flow is interpreted as

the flow magnitude. Hence, the flow magnitude is determined for each of the plurality of pixels-

-each point in the blood vessel. In addition, the first pattern (elementary streams in figure 7A)

that comprises the plurality of pixels represents the flow direction (paragraph 46) and therefore,

the flow direction is determined for each of the plurality of pixels];

wherein (b) comprises generating the second pattern as a function of the flow direction

and magnitude [paragraphs 46-48 and figures 7A-7B. Note that the second pattern (elementary

streams in figure 7B) is a function of the flow direction and magnitude (of the plurality of pixels

for the first pattern--elementary streams in figure 7A) because it represents the "change of the

blood flow" over time (paragraph 48). In summary, the second pattern (figure 7B) is a function

of the flow direction and magnitude of the first pattern (figure 7A) because it represents the

change in the first pattern over time, which is illustrated by the shift in the elementary streams

from figure 7A to 7B].

Referring to claim 18, Yoshihiro further discloses that steps (a) and (b) comprise

indicating a direction of flow with a shift of the first pattern to a different position, the second

pattern including information from the shifted first pattern (figures 7A-7C).

Referring to claim 19, Yoshihiro further discloses that steps (a) and (b) comprise

indicating a magnitude of flow with a shift of the first pattern to a different position, the second

pattern including information from the shifted first pattern (figures 7A-7C).

Referring to claim 20, Yoshihiro discloses a system for representing flow in medical

imaging, the system comprising:

    a.   a processor (50) operable to generate an at least partially persistent pattern

(elementary streams) in each of at least two images (figures 7A and 7B), the persistent pattern

shifted as a function of at least one of flow direction or flow magnitude (paragraphs 45-48); and

    b.   a display (58) operable to display the at least two images (figures 1 and 7A-7B).

    Referring to claim 21, see the rejection of at least claim 5 above.

6.   Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Yoshiya et al., J.P.

Patent No. 02-161934 ("Yoshiya"), the translation of which is attached.

Referring to claim 11, Yoshiya discloses a method for representing flow with a medical imaging system, the method comprising:

a.   generating a first pattern for a plurality of pixels associated with flow for a first image (page 6 in the translation and figure 5A. Note that the pattern 100 in frame t1 is interpreted as the first pattern);

b.   generating a second pattern for the pixels associated with flow for a second image, the second pattern responsive to the first pattern (page 6 in the translation and figure 5A. Note that the pattern 100 in frame t2 is interpreted as the second pattern, which represents a shift from the first pattern in frame t1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 8-9, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yoshihiro, J.P. Patent No. 10-94519 ("Yoshihiro") and Yoshiya et al., J.P. Patent No. 02-161934 ("Yoshiya"), the translations of which are attached.

Referring to claim 8 as best understood, Yoshihiro does not explicitly disclose that (a) and (d) comprise assigning at least one characteristic of the first and second display values as one of modulated gray scale values, color, hue and combinations thereof. However, this feature was exceedingly well known in the art. For example, Yoshiya discloses assigning at least one

characteristic of first and second display values as one of color (page 6 of the translation and figure 5A. Yoshiya discloses color flow map images).

Yoshihiro and Yoshiya are combinable because they are both concerned with blood flow imaging. Yoshihiro's first and second display values represent the blood flow, as noted above. Yoshiya explains that display values representing blood flow could be assigned color characteristics. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Yoshihiro to include the teachings of Yoshiya. The suggestion/motivation for doing so would have been to enhance the diagnosis process by providing color characteristics in addition to flow streams to represent the blood flow. Therefore, it would have been obvious to combine Yoshihiro with Yoshiya to obtain the invention as specified in claim 8.

Referring to claim 9 as best understood, Yoshiya further discloses modulating the first and second display values as a function of color flow signals (page 6 of the translation).

Referring to claim 14, Yoshihiro does not explicitly disclose the step of modulating a color of the pixel display values for the plurality of pixels as a function of a flow characteristic. However, this feature was exceedingly well known in the art. For example, Yoshiya discloses a step of modulating a color of pixel display values for a plurality of pixels as a function of a flow characteristic (page 6 of the translation and figure 5A. Yoshiya discloses a color flow map). For at least the reasons stated above (claim 8), it would have been obvious to combine Yoshihiro with Yoshiya.

8.   Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the

combination of Yoshiya et al., J.P. Patent No. 02-161934 ("Yoshiya"), the translation of which is

attached, and Mo et al., U.S. Patent No. 6,733,455 ("Mo").

Referring to claims 13-15, Yoshiya discloses color flow imaging of Doppler signals

(page 1 of the translation), but does not explicitly disclose that (a) comprises modulating gray

scale values of pixel display values for the plurality of pixels. Additionally, Yoshiya does not

explicitly disclose either the step of modulating a color of the pixel display values for the

plurality of pixels as a function of a flow characteristic, or the step of modulating the gray scale

pixel display values as a function of B-mode signals for the plurality of pixels.

Mo discloses that in color flow imaging, the color flow image is formed by modulating

gray scale values of pixel display values for plurality of pixels and by modulating a color of the

pixel display values for the plurality of pixels as a function of a flow characteristic, which is

written onto a B-mode image (col. 3, lines 5-15).

Yoshiya and Mo are combinable because they are both concerned with color flow

imaging for Doppler signal systems. At the time of the invention, it would have been obvious to

a person of ordinary skill in the art to modify the method of Yoshiya to include the teachings of

Mo. The suggestion/motivation for doing so would have been to enhance the diagnosis process

by providing color and gray scale displays. Therefore, it would have been obvious to combine

Yoshiya with Mo to obtain the invention as specified in claims 13-15.

Allowable Subject Matter

9.   Claims 7, 10, 12 are objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the base

claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Charles Kim whose telephone number is 571-272-7421. The

examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am

to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the

organization where this application or proceeding is assigned is 571-272-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ck
January 11, 2007

BHAVESH M MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600